

We claim:

1. A method of producing radiance transfer coefficients for a set of points sampled over a modeled object for rendering images of the object on a computer, the method comprising:

creating an object positions texture representing positions of a set of points sampled over the object mapped into a texture space;

creating an object normals texture representing normals of the set of sampled points mapped into the texture space;

iteratively, for each of a set of directions sampled about the object,

rendering the object from the direction to produce a shadow buffer representing depth from the object in the direction for the set of points;

as a texture-based operation, determining cosine terms of the set of sampled points for the currently iterated direction based on the normals represented in the object normals texture and currently iterated direction;

as a texture-based operation, determining shadowing of the set of sampled points for the currently iterated direction based on the depths represented in the shadow buffer and positions represented in the object positions texture;

as a texture-based operation determining radiance transfer contribution of the set of sampled points for the currently iterated direction based on the determined cosine terms and shadowing; and

accumulating the radiance transfer contributions of the set of sampled points for the currently iterated direction with that of previously iterated directions;

rendering an image of the object in a lighting environment based on the accumulated radiance transfer contributions; and
presenting the image.

2. A computer system for hardware-accelerated processing of a radiance transfer coefficients computation for a set of points sampled over a modeled object for use in rendering images of the object, the computer system comprising:

a memory for storing program code of at least one pixel shader and a radiance transfer coefficients processing program;

a central processing unit operating to execute the radiance transfer coefficients processing program;

a graphics processing unit programmable by and operating to execute the at least one pixel shader;

wherein the radiance transfer coefficients processing program executing on the central processing unit creates an object positions texture representing positions of a set of points sampled over the object mapped into a texture space, and creates an object normals texture representing normals of the set of sampled points mapped into the texture space;

wherein the at least one pixel shader executing on the graphics processing unit performs texture operations that iteratively, for each of a set of directions sampled about the object,

render the object from the direction to produce a shadow buffer representing depth from the object in the direction for the set of points;

determine cosine terms of the set of sampled points for the currently iterated direction based on the normals represented in the object normals texture and currently iterated direction;

determine shadowing of the set of sampled points for the currently iterated direction based on the depths represented in the shadow buffer and positions represented in the object positions texture;

determine radiance transfer contribution of the set of sampled points for the currently iterated direction based on the determined cosine terms and shadowing; and

accumulate the radiance transfer contributions of the set of sampled points for the currently iterated direction with that of previously iterated directions.

3. Computer-readable media having stored thereon programming code executable at least in part on graphics accelerating hardware on a computer to perform processing of a radiance transfer coefficients computation for a set of points sampled over a modeled

5 object for use in rendering images of the object, the programming code comprising:

code means executable on a computer for creating an object positions texture representing positions of a set of points sampled over the object mapped into a texture space;

10 code means executable on a computer for creating an object normals texture representing normals of the set of sampled points mapped into the texture space;

code means executable on the graphics accelerating hardware of the computer to perform texture-based operations that iteratively, for each of a set of directions sampled about the object,

15 render the object from the direction to produce a shadow buffer representing depth from the object in the direction for the set of points;

determine cosine terms of the set of sampled points for the currently iterated direction based on the normals represented in the object normals texture and currently iterated direction;

20 determine shadowing of the set of sampled points for the currently iterated direction based on the depths represented in the shadow buffer and positions represented in the object positions texture;

determine radiance transfer contribution of the set of sampled points for the currently iterated direction based on the determined cosine terms and shadowing; and

25 accumulate the radiance transfer contributions of the set of sampled points for the currently iterated direction with that of previously iterated directions.